PROLONGING THE PRODUCTIVE LIFE OF *Ganoderma*-INFECTED PALMS WITH HEXACONAZOLE

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JUNE 2004

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MPOB TT No. 214

MPOB INFORMATION SERIES ISSN 1511-7871

Basal stem rot (BSR) disease caused by species of *Ganoderma* is presently the most prevalent and devastating disease in oil palm cultivation, especially in mature palm areas in Malaysia. Some of the estate practices for controlling this disease consist of surgical, removal of infected palms, soil mounding, fungicide treatment or combination of these methods (Ariffin and Idris, 2002). A pressure-injection capable of delivering the fungicides to the target sites for controlling BSR disease has been developed by MPOB (Idris *et al*., 2002). This apparatus is capable of pressure-injecting fungicides quickly and efficiently. Earlier studies indicated that bromoconazole and hexaconazole, both in the triazole group, were effective in prolonging the productive life of infected palms in comparison with four other fungicides such as benomyl and thiram, triadimefon, triadimenol and tridemorph. Hexaconazole, a systemic triazole fungicide was made available in Malaysia for controlling a broad spectrum of diseases and was more efficacious and cost-effective than other triazole fungicides. This fungicide is active mainly against basidiomycetes and ascomycetes where it is a potent inhibitor of ergosterol biosynthesis (Shephard *et al*., 1986). As a systemic fungicide, it is transported in the xylem and there is no evidence of phloem mobility. This paper reports on the bioefficacy of hexaconazole for prolonging the productive life of the *Ganoderma*-infected mature palms.

FIELD EVALUATION METHODS OF HEXACONAZOLE APPLICATION

A field study was carried out to determine the effects of different methods of hexaconazole application to control *Ganoderma*-infected palms. Hexaconazole was applied at 90 ml palm^{-1} (4.5 g active ingredient). Palms were treated with hexaconazole at approximately nine-month intervals with a total of three times application. These palms were observed for a period of five years. This study was conducted on 18-year-old palms (first generation of oil palm) planted on coastal soil at Sepang, Selangor. The study area was 48 ha. In this study, palms were selected based on the presence of *Ganoderma* basidiomata and/or rotted stem tissues at the base with the palms still producing fruit bunches. There were no distinct foliar symptoms typical of BSR (*Figure 1*).

The palms were marked and treated as below with each treatment repeated on 30 palms. The effects of hexaconazole were assessed at three-month intervals by checking the palm survival and the presence or absence of fruit bunches. Four methods of hexaconazole application and two controls were evaluated as follows:

T1 - Three holes were drilled using an engine drill with a drill bit (size 40 cm length and 1.1 cm diameter), then 90 ml of hexaconazole was dissolved in 10 litres

ISSN 1511-7871
9 771511 787001

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Figure 1. Mature palm confirmed infected with Ganoderma *but no distinct foliar symptoms and still producing fruit bunches.*

of water and the solution was pressure-injected into three holes (4 litres in one hole in diseased stem and 3 litres each in two holes in healthy stem) at the palm base using pressure injection (*Figure 2a*).

T2 - Same as treatment T1, but 90 ml of hexaconazole was dissolved in 5 litres of water and the solution was pressure injected into three holes (3 litres in one hole in diseased stem and 1 litre each in two holes in healthy stem) at the palm base using pressure-injection.

T3 - Three holes were drilled using engine drill with a drill bit (size 48 cm length and 1.9 cm diameter), then 90 ml of hexaconazole was introduced slowly into three holes (30 ml in one hole in diseased stem and 30 ml each in two holes in healthy stem) using a syringe (*Figure 2b*).

T4 - Hexaconazole applied through soil drenching, where 90 ml of hexaconazole was dissolved in 10 litres of water, then applied within a radius of 45 cm from the trunk using a watering can (*Figure 2c*).

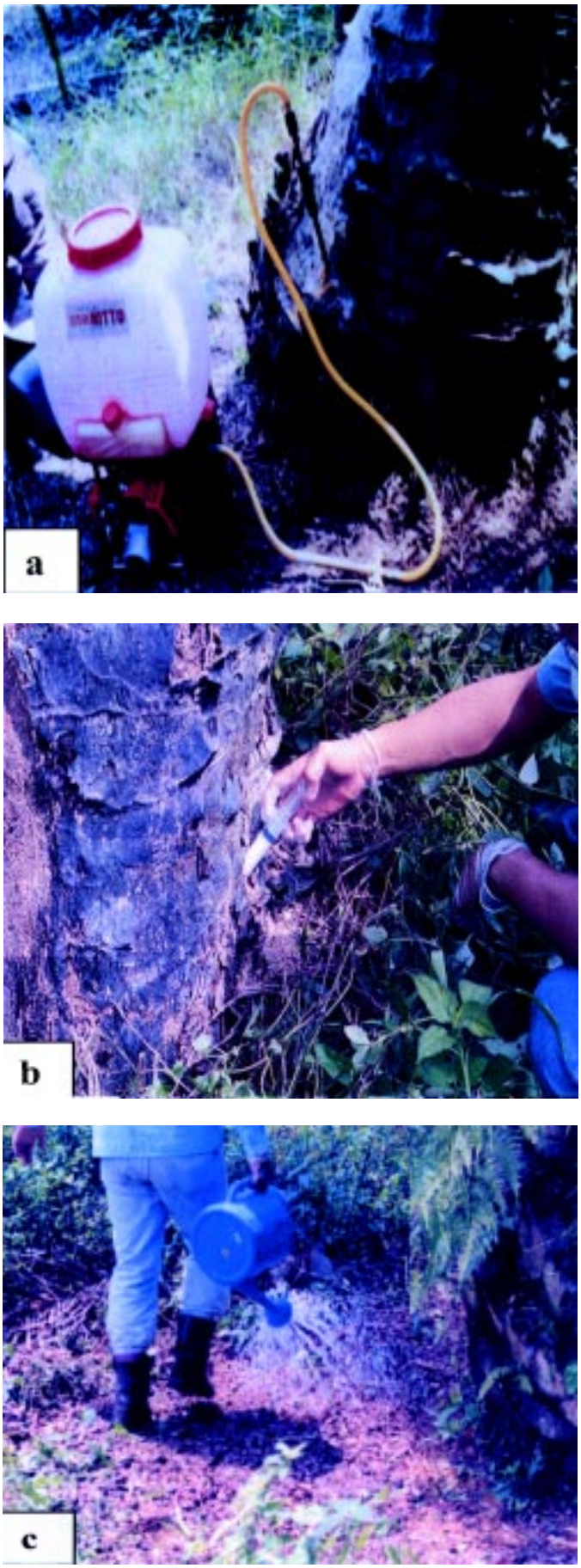

Figure 2. Comparing methods of hexaconazole application to control Ganoderma*-infected palms by using (a) pressure-injection, (b) syringe or (c) soil drenching.*

T5 - Control I, where three holes were drilled using engine drill with a drill bit (size 40 cm length and 1.1 cm diameter), then 10 litres of water was pressure-injected into three holes (4 litres in one hole in diseased stem and 3 litres each in two holes in healthy stem) at the palm base using pressure-injection.

T6 - Control 2 (untreated).

The results of the study are presented in *Figures 3a* and *3b*. It was shown that hexaconazole dissolved in 10 litres of water applied with pressure-injection gave higher percentage of palms survival and also palms producing fruit bunches when compared to other methods of application. After five years, 70% of palms treated with hexaconazole dissolved in 10 litres of water were still living and producing fruit bunches. The number of surviving palms and palms producing fruit bunches were reduced to 43.3% when hexaconazole was dissolved in 5 litres of water and only 3.3% when hexaconazole was applied using syringe or through soil drenching. Untreated palms did not survive after this period.

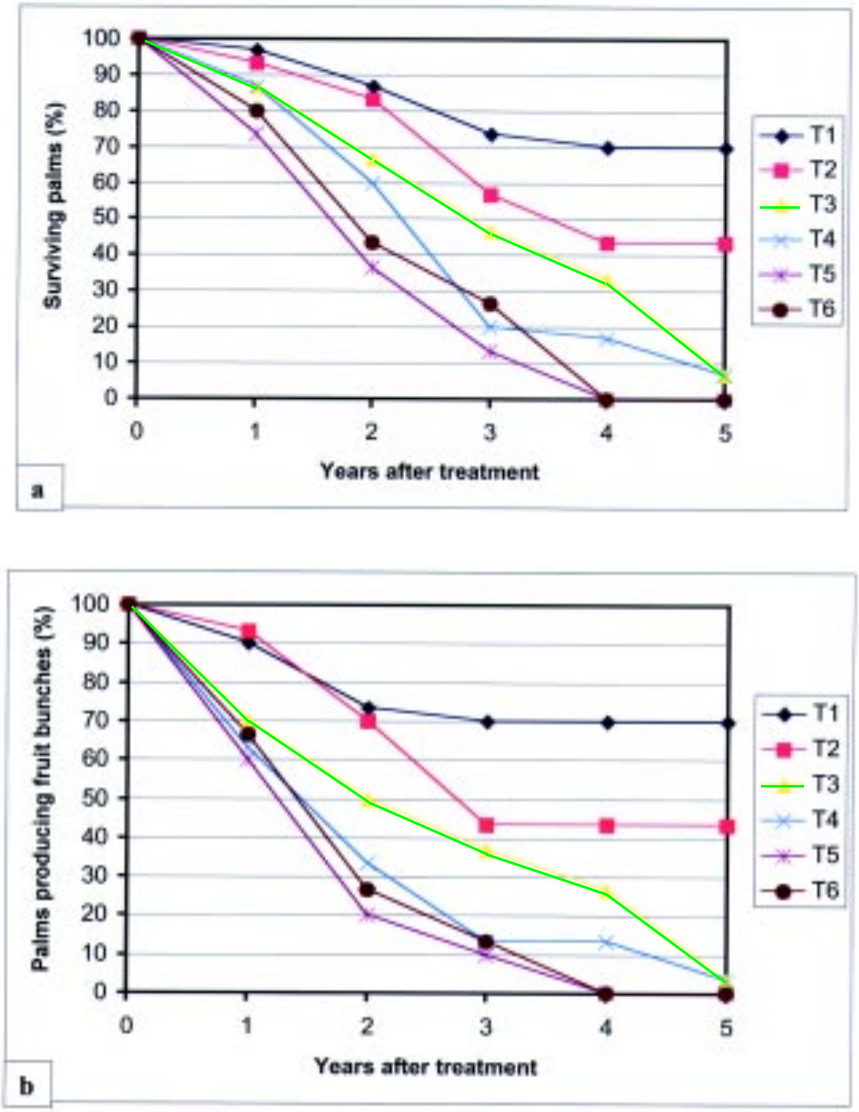

Figure 3. Percentage of (a) surviving palms and (b) palms producing fruit bunches of the Ganoderma*-infected palms with hexaconazole applied with different methods of application.*

CONCLUSION

These studies have demonstrated that the application of hexaconazole with pressure-injection had limited the spread of *Ganoderma* infection within the infected standing palms. Therefore, it can improve oil palm productivity by prolonging the life of the infected palm.

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